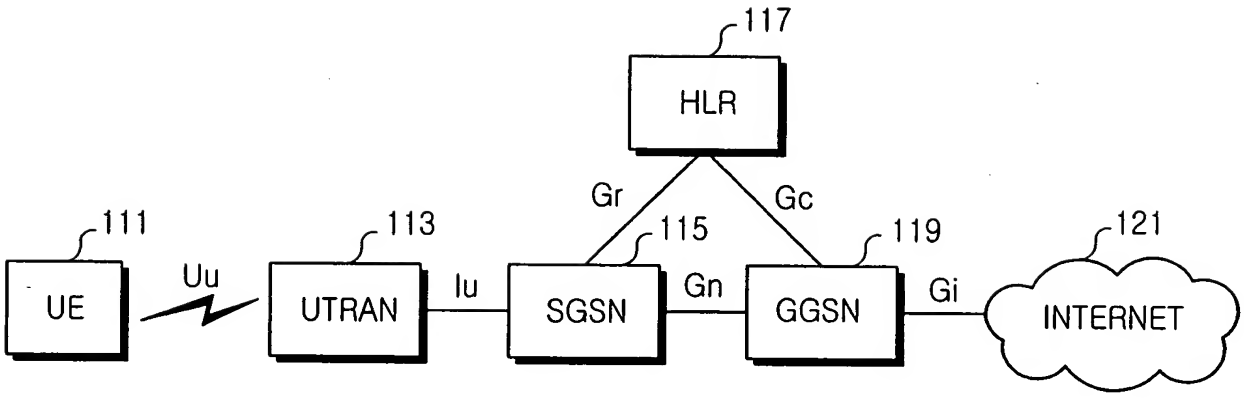
117
HLR
Gr
Gc
111
113
115
119
121
UE
Uu
UTRAN
Iu
SGSN
Gn
GGSN
Gi
INTERNET

FIG.1

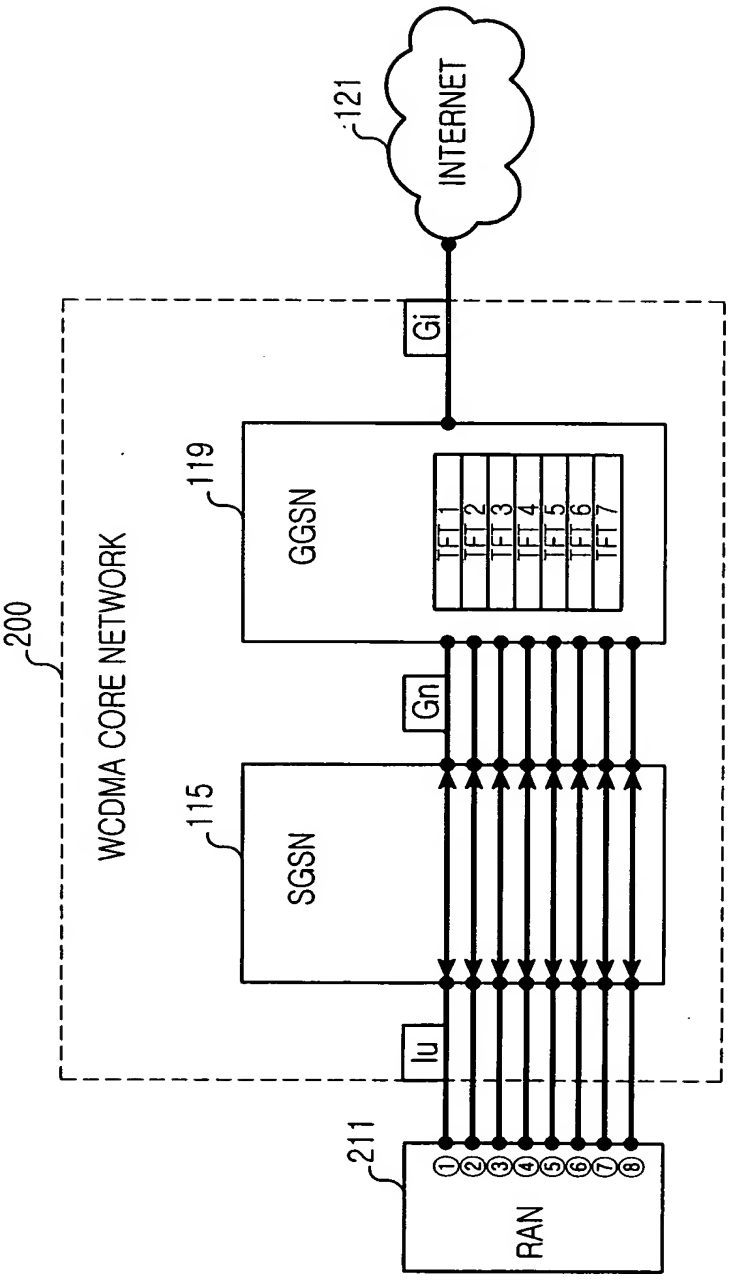
INTERNET
121
Gi
GGSN
119
TFT 1
TFT 2
TFT 3
TFT 4
TFT 5
TFT 6
TFT 7
200
WCDMA CORE NETWORK
Gn
SGSN
115
Iu
RAN
211
1
2
3
4
5
6
7
8

FIG.2

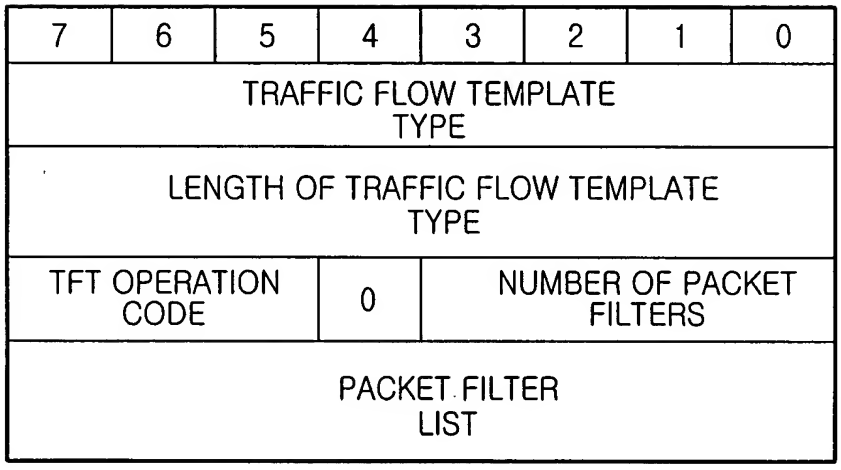
7
6
5
4
3
2
1
0
TRAFFIC FLOW TEMPLATE TYPE
LENGTH OF TRAFFIC FLOW TEMPLATE TYPE
TFT OPERATION CODE
0
NUMBER OF PACKET FILTERS
PACKET FILTER LIST

FIG.3

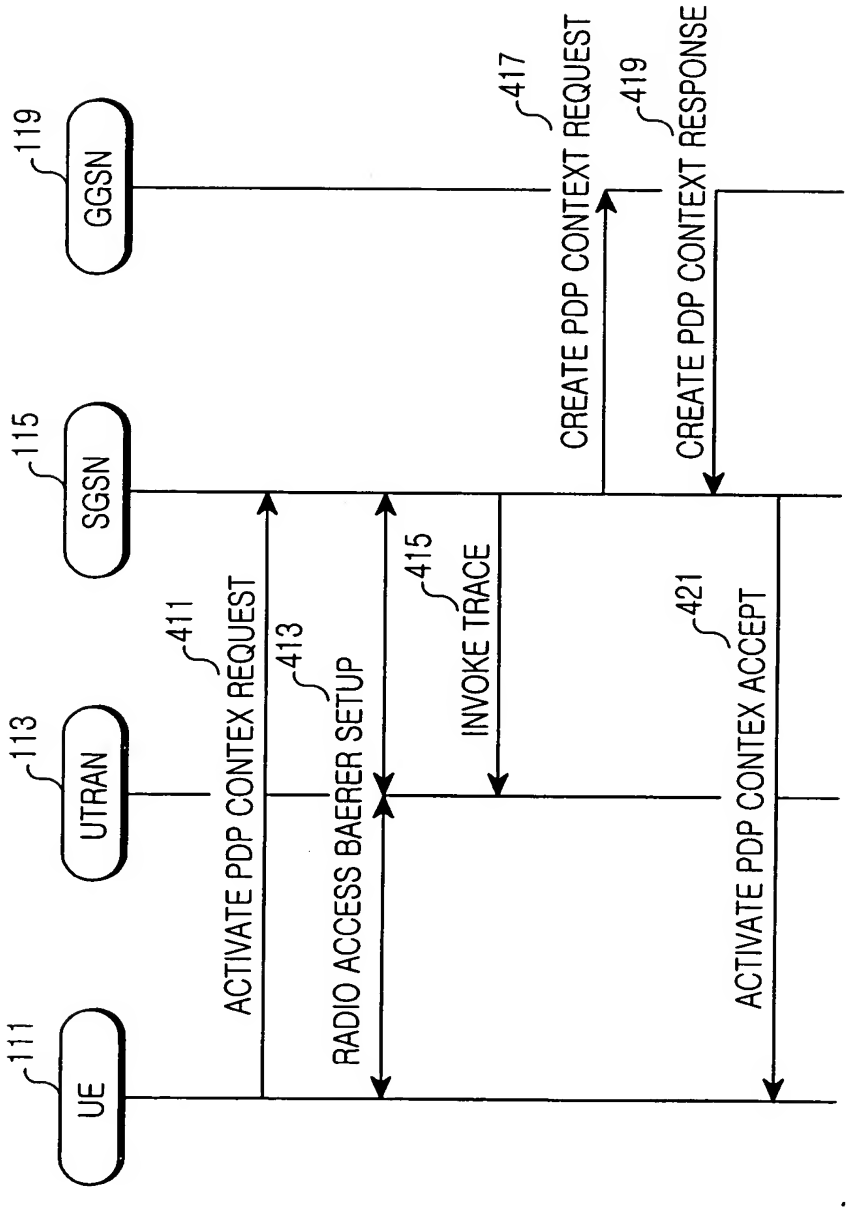
111
UE
113
UTRAN
115
SGSN
119
GGSN
411
ACTIVATE PDP CONTEX REQUEST
413
RADIO ACCESS BAERER SETUP
415
INVOKE TRACE
417
CREATE PDP CONTEXT REQUEST
419
CREATE PDP CONTEXT RESPONSE
421
ACTIVATE PDP CONTEX ACCEPT

FIG. 4

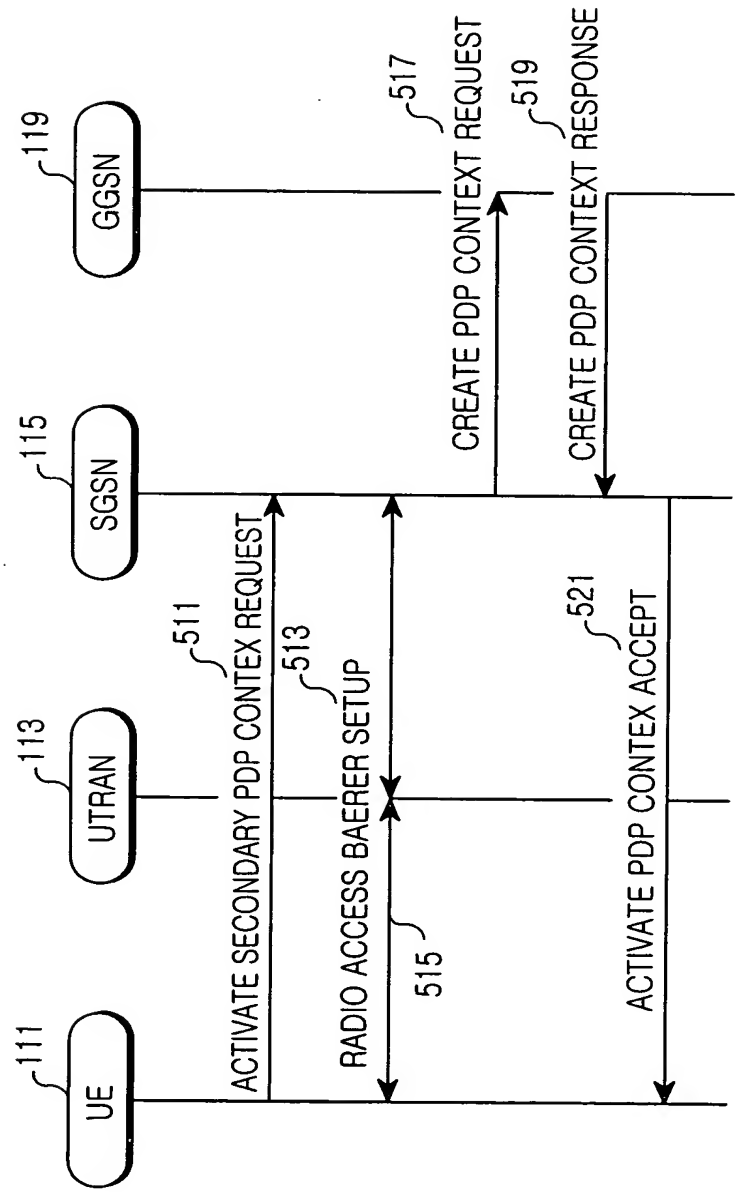
111
UE
113
UTRAN
115
SGSN
119
GGSN
511
ACTIVATE SECONDARY PDP CONTEX REQUEST
513
RADIO ACCESS BAERER SETUP
515
517
CREATE PDP CONTEXT REQUEST
519
CREATE PDP CONTEXT RESPONSE
521
ACTIVATE PDP CONTEX ACCEPT

FIG.5

7	6	5	4	3	2	1	0
TRAFFIC FLOW TEMPLATE TYPE							
LENGTH OF TRAFFIC FLOW TEMPLATE TYPE							
TFT OPERATION CODE			0	NUMBER OF PACKET FILTERS			
PACKET FILTER IDENTIFIER 1							
PACKET FILTER EVALUATION PRECEDENCE 1							
LENGTH OF PACKET FILTER CONTENTS 1							
PACKET FILTER CONTENTS 1							
PACKET FILTER IDENTIFIER 2							
PACKET FILTER EVALUATION PRECEDENCE 2							
LENGTH OF PACKET FILTER CONTENTS 2							
PACKET FILTER CONTENTS 2							
.....							

FIG.6

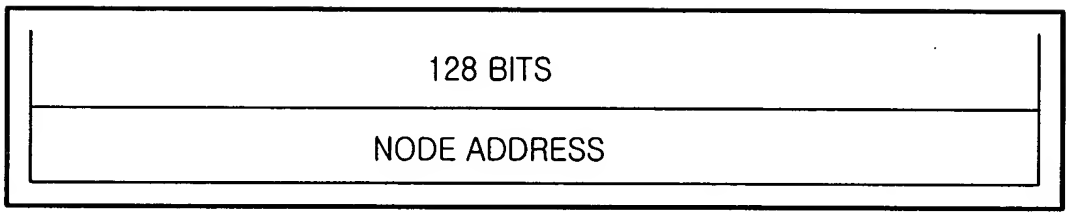

FIG.7

7	6	5	4	3	2	1	0
TRAFFIC FLOW TEMPLATE TYPE							
LENGTH OF TRAFFIC FLOW TEMPLATE TYPE							
TFT OPERATION CODE			0	NUMBER OF PACKET FILTERS			

FIG.8

7	6	5	4	3	2	1	0
TRAFFIC FLOW TEMPLATE TYPE							
LENGTH OF TRAFFIC FLOW TEMPLATE TYPE							
TFT OPERATION CODE			0	NUMBER OF PACKET FILTERS			
PACKET FILTER IDENTIFIER 1							
PACKET FILTER IDENTIFIER 2							
. . . . .							
PACKET FILTER IDENTIFIER N							

FIG.9

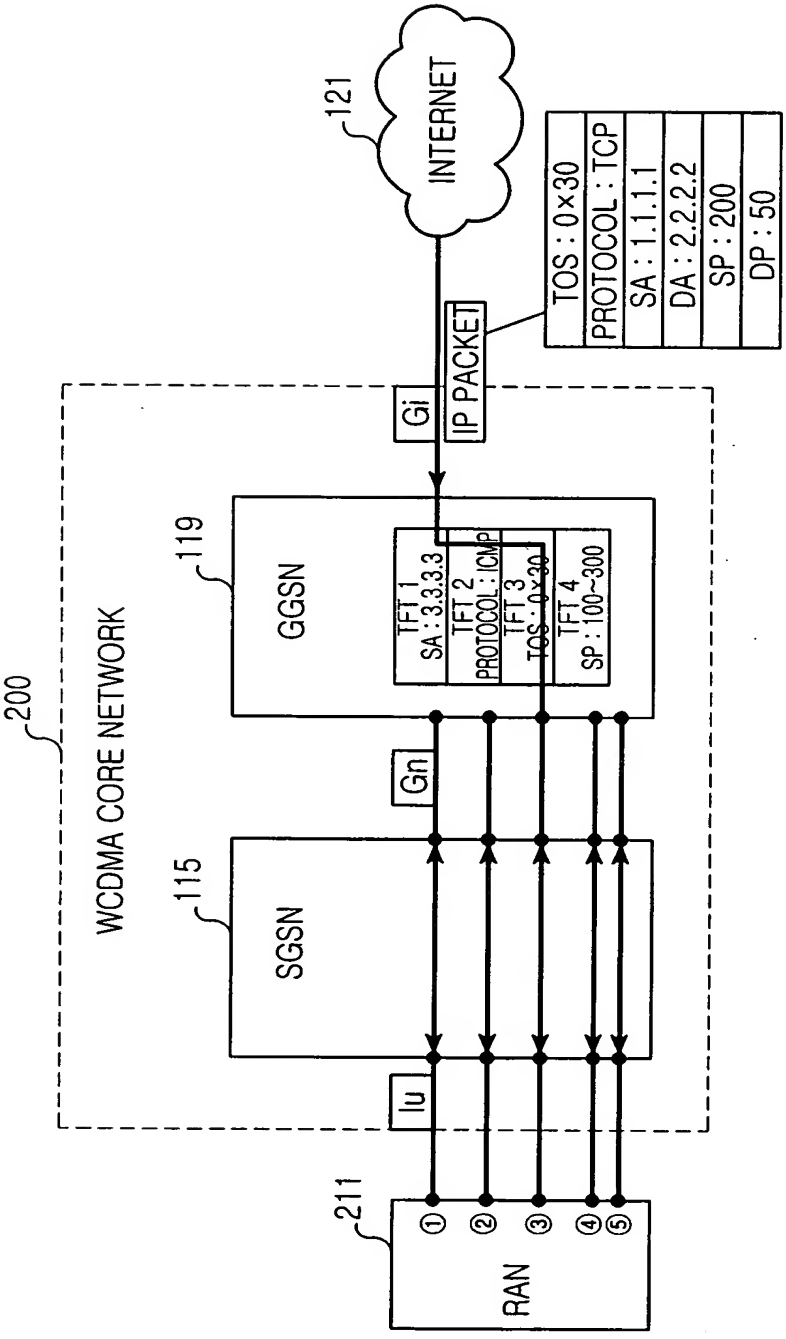
121
INTERNET
TOS : 0×30
PROTOCOL : TCP
SA : 1.1.1.1
DA : 2.2.2.2
SP : 200
DP : 50
IP PACKET
Gi
200
WCDMA CORE NETWORK
119
GGSN
TFT 1
SA : 3.3.3.3
TFT 2
PROTOCOL : ICMP
TFT 3
TOS : 0×30
TFT 4
SP : 100~300
Gn
115
SGSN
Iu
211
RAN
①
②
③
④
⑤

FIG.10

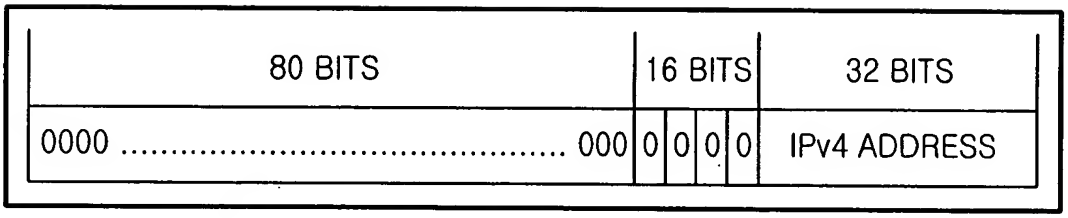
80 BITS
16 BITS
32 BITS
0000 000
0
0
0
0
IPv4 ADDRESS

FIG.11

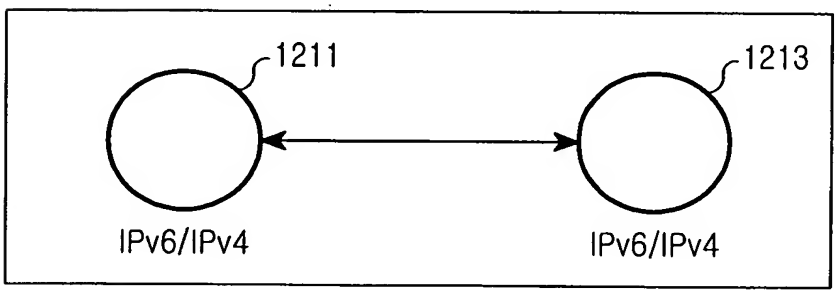
1211
1213
IPv6/IPv4
IPv6/IPv4

FIG.12

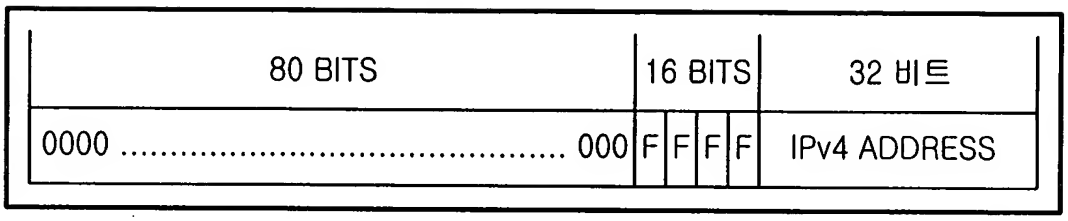
80 BITS
16 BITS
32 비트
0000 000
F
F
F
F
IPv4 ADDRESS

FIG.13

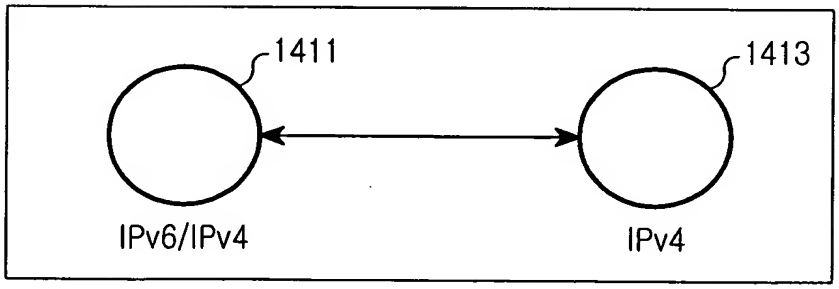
1411
1413
IPv6/IPv4
IPv4

FIG.14

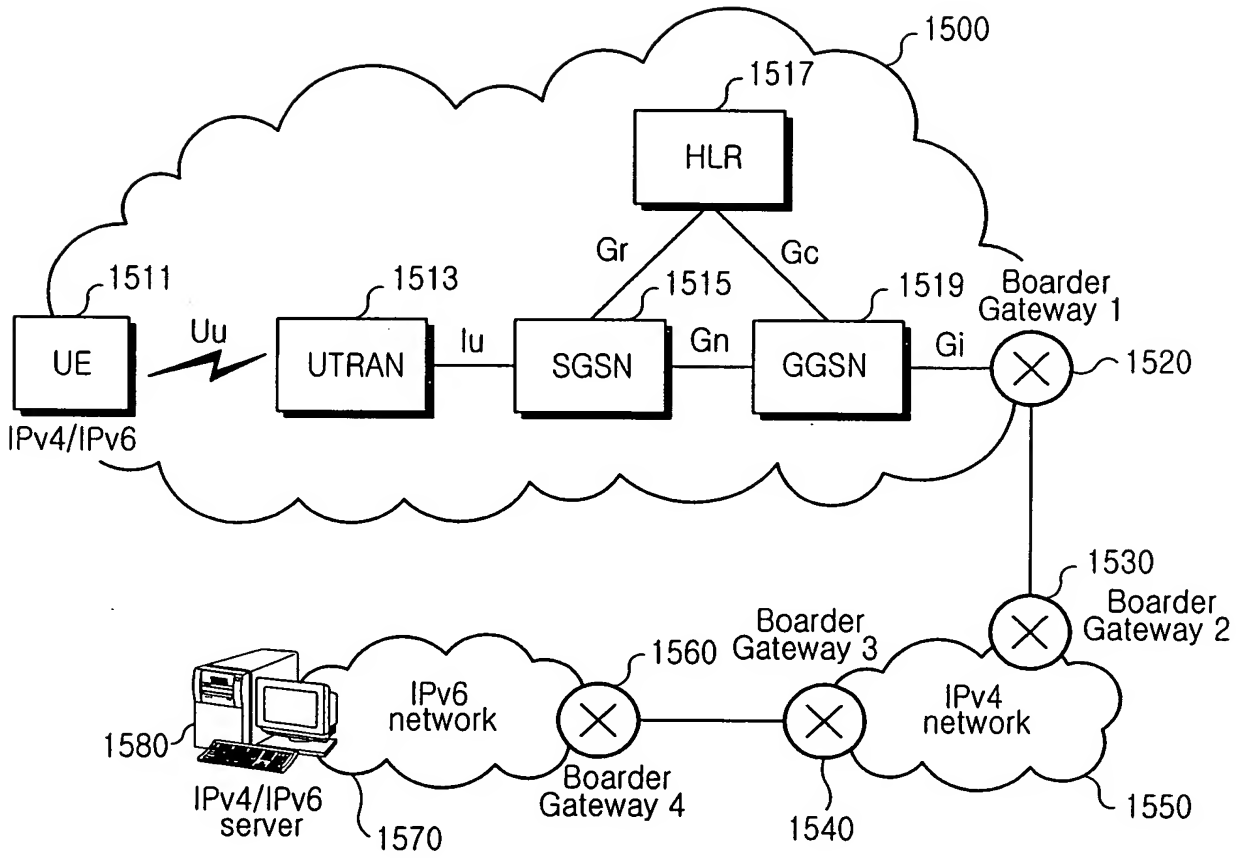
1500
1517
HLR
Gr
Gc
1511
1513
1515
1519
Boarder
Gateway 1
UE
Uu
UTRAN
Iu
SGSN
Gn
GGSN
Gi
1520
IPv4/IPv6
1530
Boarder
Gateway 2
Boarder
Gateway 3
1560
IPv6
network
IPv4
network
1580
IPv4/IPv6
server
1570
Boarder
Gateway 4
1540
1550

FIG.15

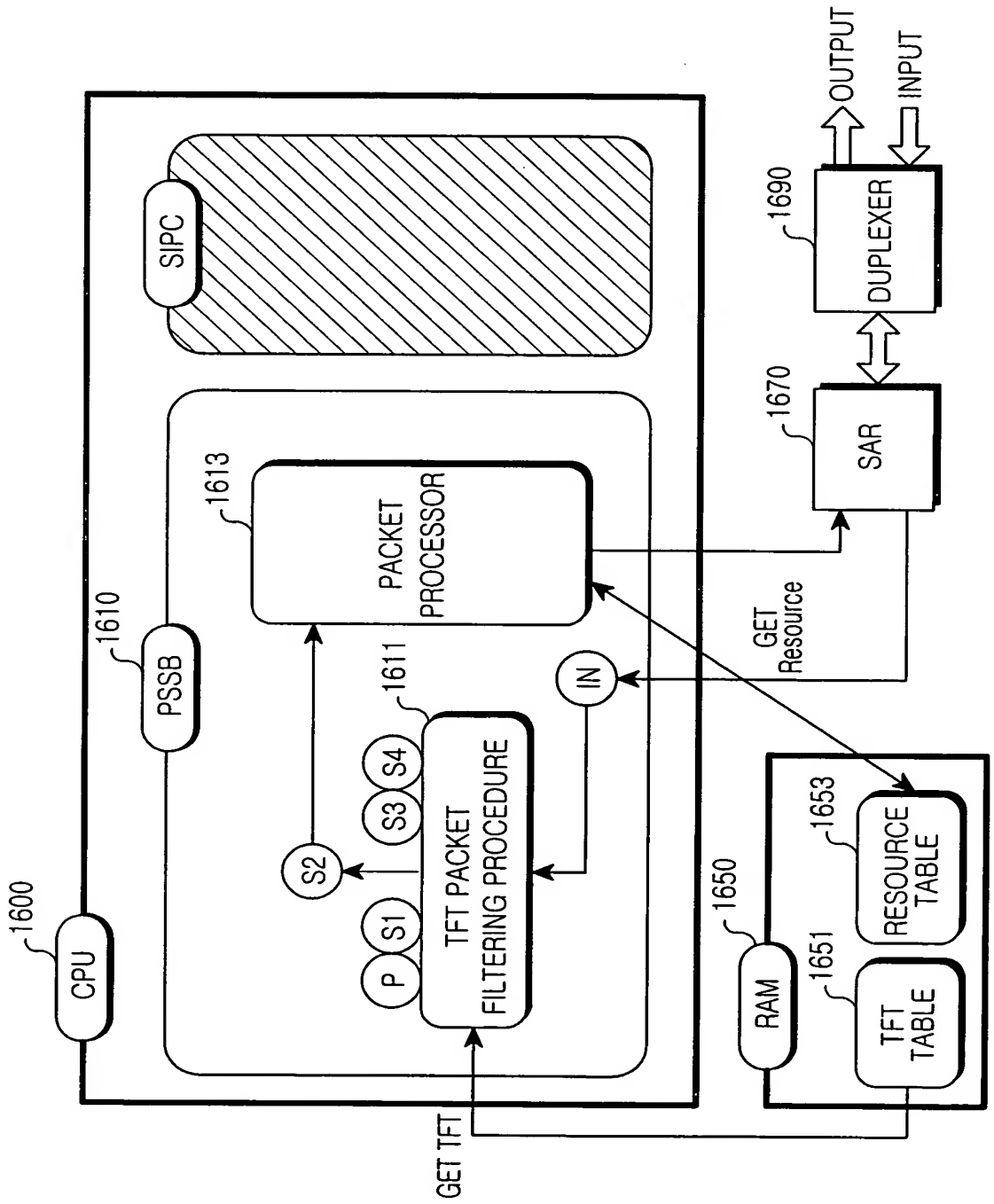
1600
CPU
1610
PSSB
SIPC
1613
PACKET PROCESSOR
1611
TFT PACKET FILTERING PROCEDURE
P
S1
S2
S3
S4
IN
GET TFT
GET Resource
1650
RAM
1651
TFT TABLE
1653
RESOURCE TABLE
1670
SAR
1690
DUPLEXER
OUTPUT
INPUT

FIG.16

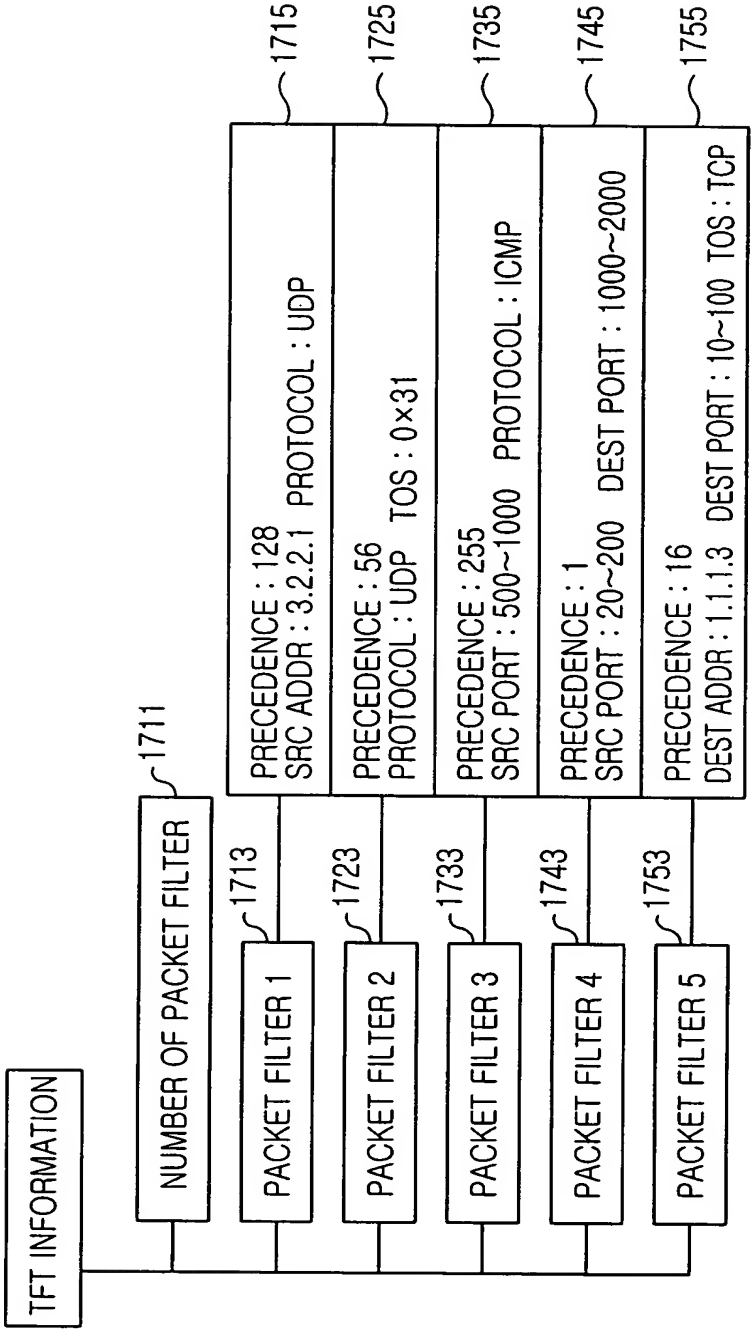
TFT INFORMATION
NUMBER OF PACKET FILTER
1711
PACKET FILTER 1
1713
PACKET FILTER 2
1723
PACKET FILTER 3
1733
PACKET FILTER 4
1743
PACKET FILTER 5
1753
PRECEDENCE : 128
SRC ADDR : 3.2.2.1 PROTOCOL : UDP
1715
PRECEDENCE : 56
PROTOCOL : UDP TOS : 0×31
1725
PRECEDENCE : 255
SRC PORT : 500~1000 PROTOCOL : ICMP
1735
PRECEDENCE : 1
SRC PORT : 20~200 DEST PORT : 1000~2000
1745
PRECEDENCE : 16
DEST ADDR : 1.1.1.3 DEST PORT : 10~100 TOS : TCP
1755

FIG.17

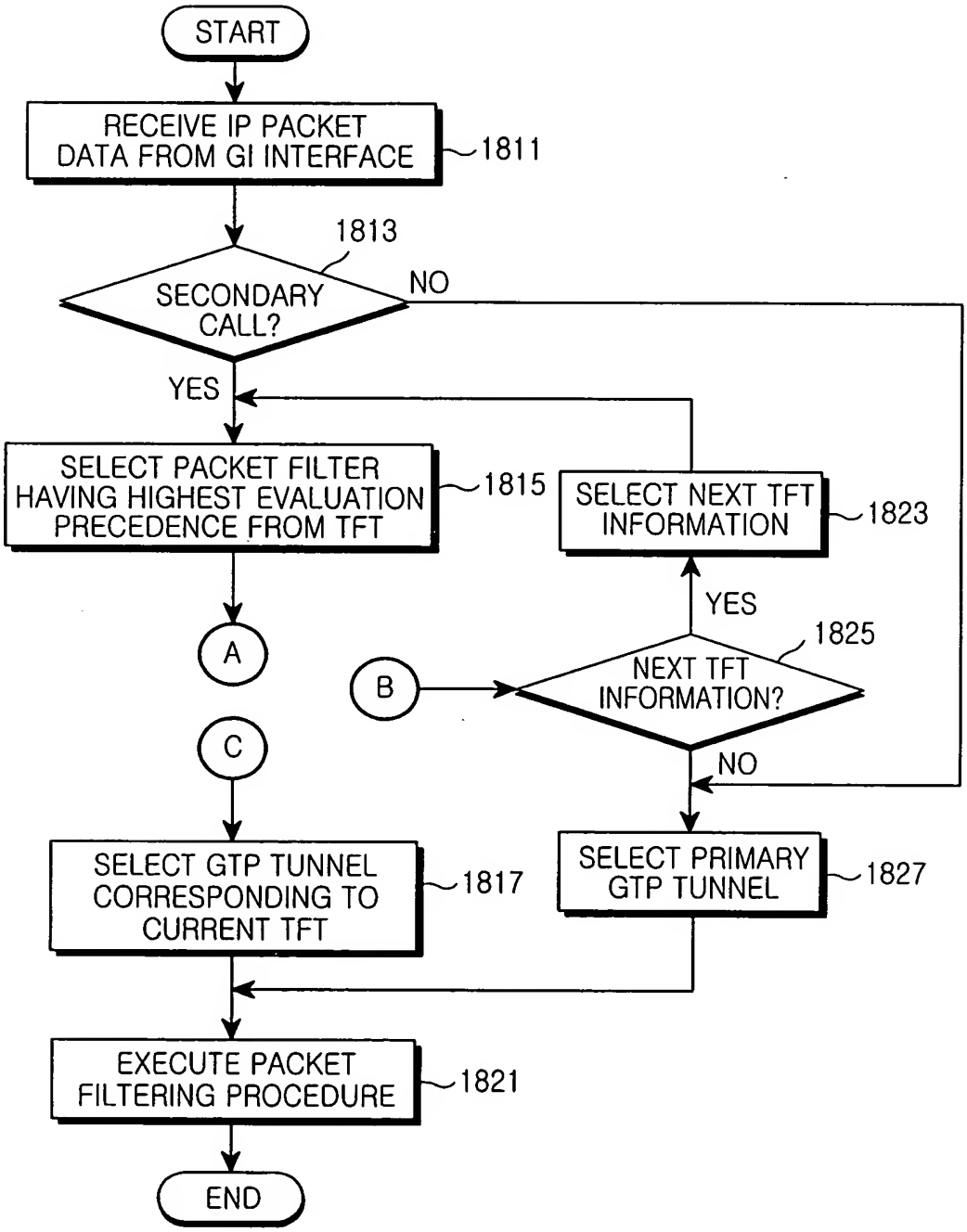
START
RECEIVE IP PACKET DATA FROM GI INTERFACE
1811
1813
SECONDARY CALL?
NO
YES
SELECT PACKET FILTER HAVING HIGHEST EVALUATION PRECEDENCE FROM TFT
1815
SELECT NEXT TFT INFORMATION
1823
YES
1825
NEXT TFT INFORMATION?
NO
A
B
C
SELECT GTP TUNNEL CORRESPONDING TO CURRENT TFT
1817
SELECT PRIMARY GTP TUNNEL
1827
EXECUTE PACKET FILTERING PROCEDURE
1821
END

FIG.18A

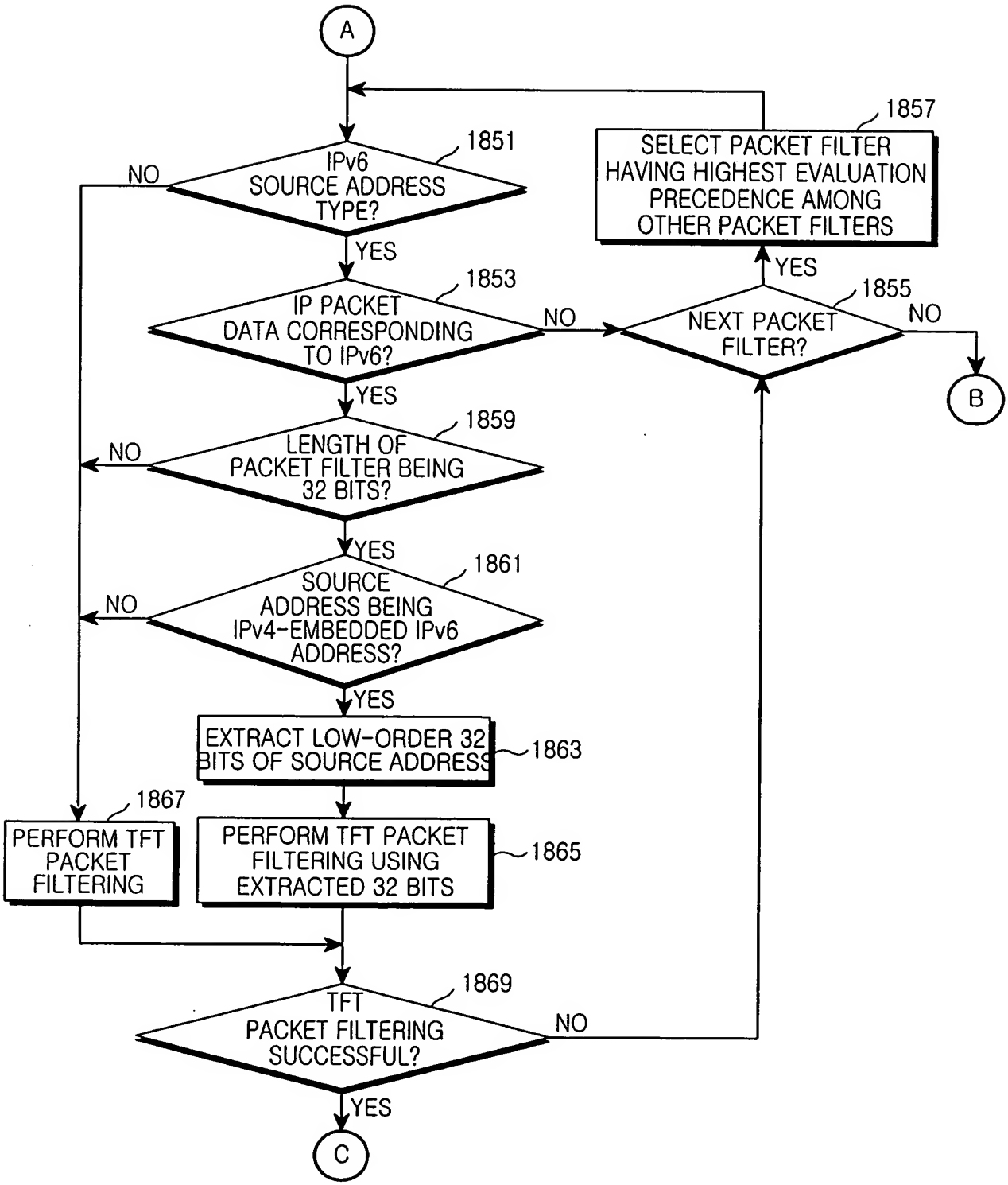
A
1851
IPv6 SOURCE ADDRESS TYPE?
NO
YES
1853
IP PACKET DATA CORRESPONDING TO IPv6?
NO
YES
1855
NEXT PACKET FILTER?
NO
B
YES
1857
SELECT PACKET FILTER HAVING HIGHEST EVALUATION PRECEDENCE AMONG OTHER PACKET FILTERS
1859
LENGTH OF PACKET FILTER BEING 32 BITS?
NO
YES
1861
SOURCE ADDRESS BEING IPv4-EMBEDDED IPv6 ADDRESS?
NO
YES
EXTRACT LOW-ORDER 32 BITS OF SOURCE ADDRESS
1863
PERFORM TFT PACKET FILTERING USING EXTRACTED 32 BITS
1865
1867
PERFORM TFT PACKET FILTERING
1869
TFT PACKET FILTERING SUCCESSFUL?
NO
YES
C

FIG.18B

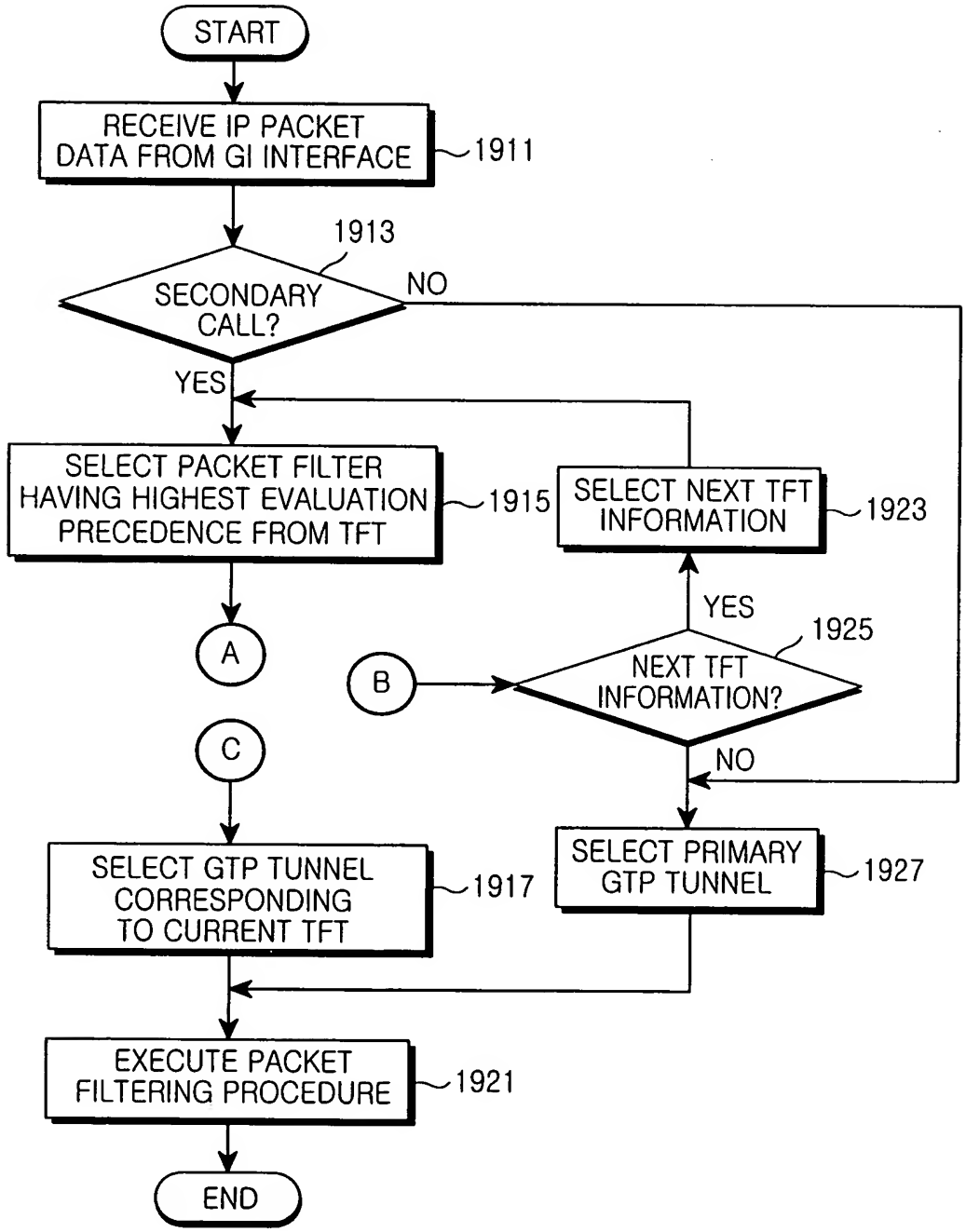
START
RECEIVE IP PACKET DATA FROM GI INTERFACE
1911
1913
SECONDARY CALL?
NO
YES
SELECT PACKET FILTER HAVING HIGHEST EVALUATION PRECEDENCE FROM TFT
1915
SELECT NEXT TFT INFORMATION
1923
YES
1925
NEXT TFT INFORMATION?
NO
A
B
C
SELECT GTP TUNNEL CORRESPONDING TO CURRENT TFT
1917
SELECT PRIMARY GTP TUNNEL
1927
EXECUTE PACKET FILTERING PROCEDURE
1921
END

FIG.19A

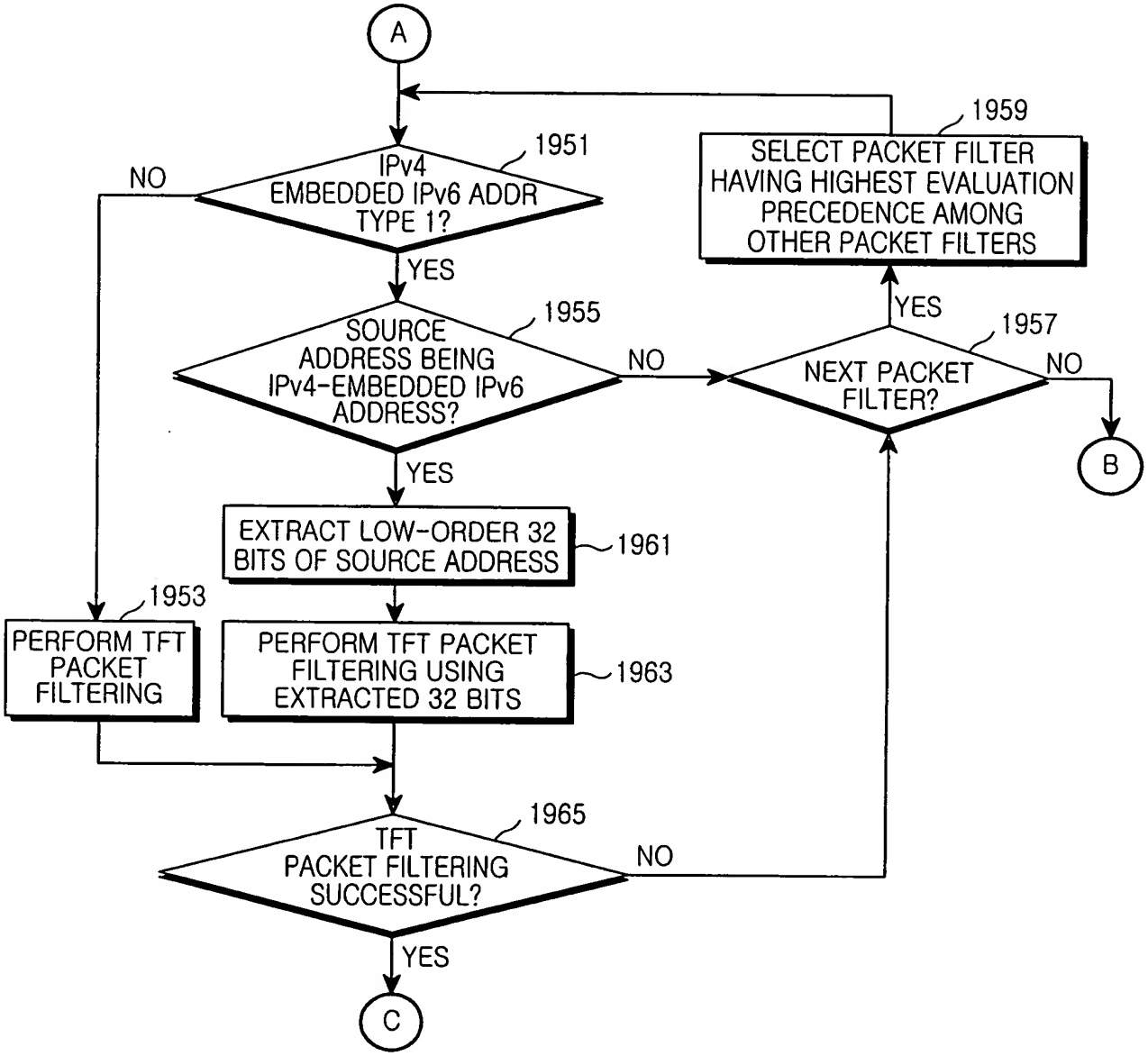
A
IPv4 EMBEDDED IPv6 ADDR TYPE 1?
1951
NO
YES
SOURCE ADDRESS BEING IPv4-EMBEDDED IPv6 ADDRESS?
1955
NO
YES
EXTRACT LOW-ORDER 32 BITS OF SOURCE ADDRESS
1961
PERFORM TFT PACKET FILTERING
1953
PERFORM TFT PACKET FILTERING USING EXTRACTED 32 BITS
1963
TFT PACKET FILTERING SUCCESSFUL?
1965
NO
YES
C
SELECT PACKET FILTER HAVING HIGHEST EVALUATION PRECEDENCE AMONG OTHER PACKET FILTERS
1959
YES
NEXT PACKET FILTER?
1957
NO
B

FIG.19B

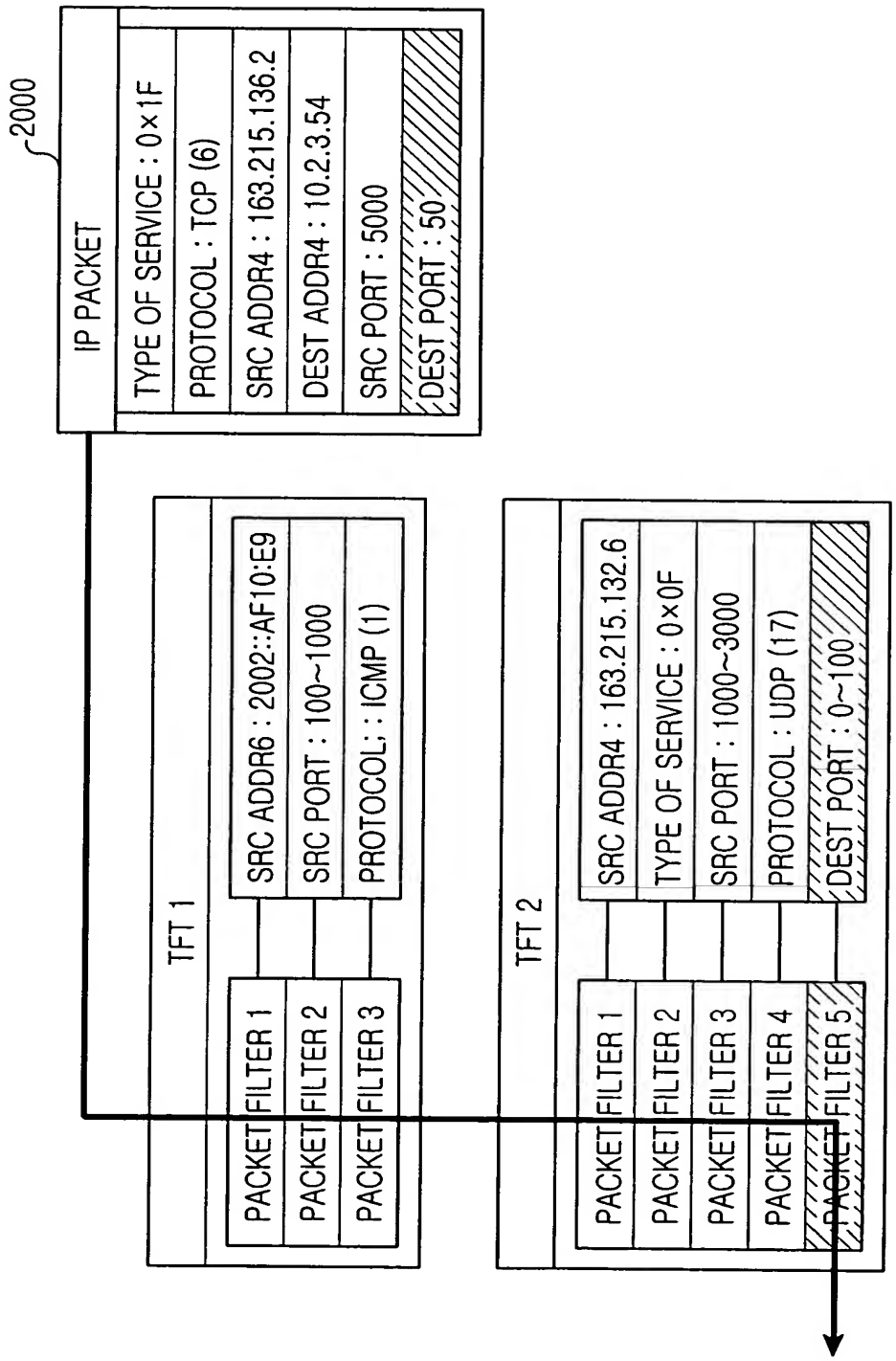
2000
IP PACKET
TYPE OF SERVICE : 0×1F
PROTOCOL : TCP (6)
SRC ADDR4 : 163.215.136.2
DEST ADDR4 : 10.2.3.54
SRC PORT : 5000
DEST PORT : 50
TFT 1
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
SRC ADDR6 : 2002::AF10:E9
SRC PORT : 100~1000
PROTOCOL; : ICMP (1)
TFT 2
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
PACKET FILTER 4
PACKET FILTER 5
SRC ADDR4 : 163.215.132.6
TYPE OF SERVICE : 0×0F
SRC PORT : 1000~3000
PROTOCOL : UDP (17)
DEST PORT : 0~100

FIG.20

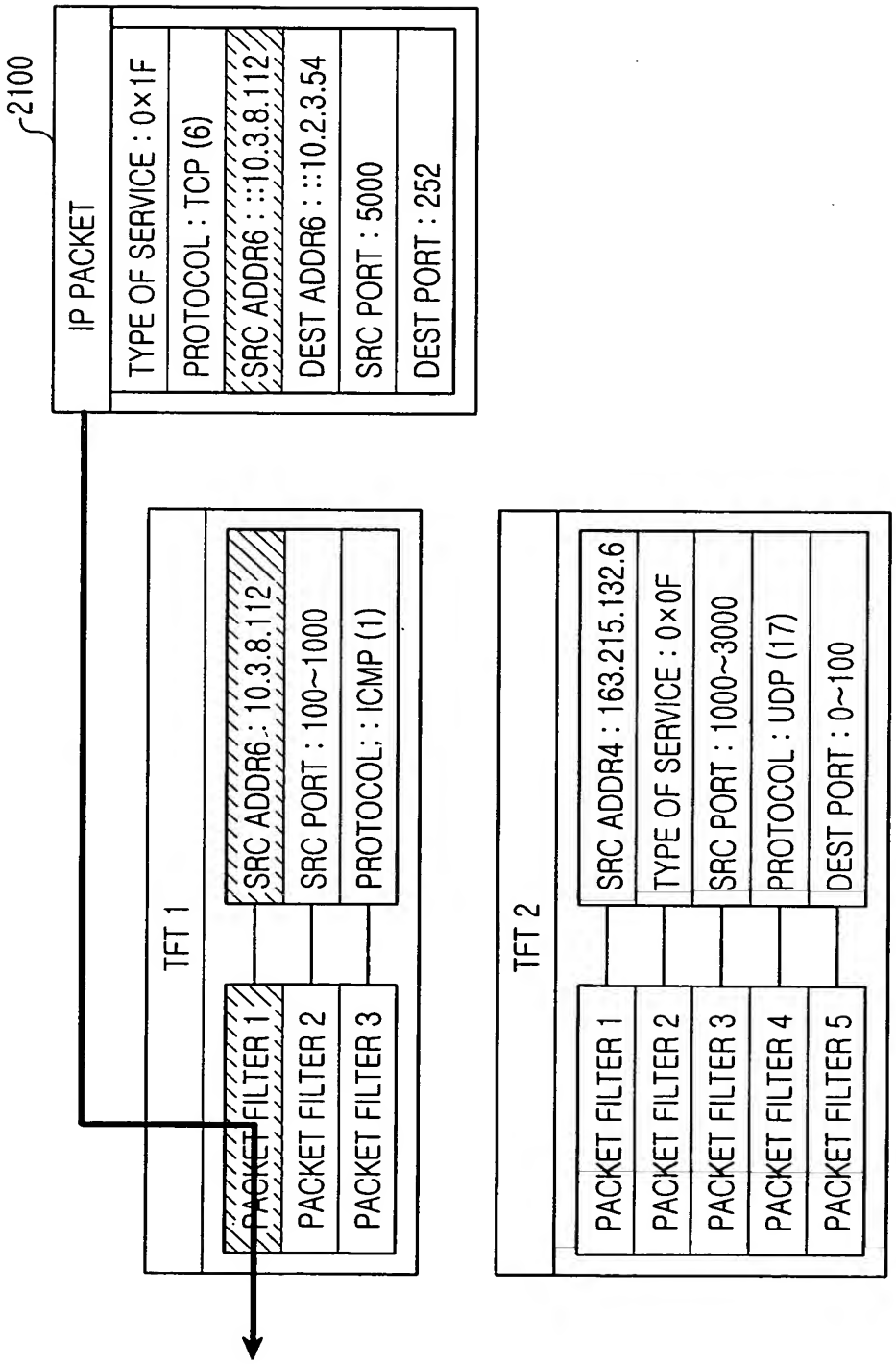
2100
IP PACKET
TYPE OF SERVICE : 0×1F
PROTOCOL : TCP (6)
SRC ADDR6 : ::10.3.8.112
DEST ADDR6 : ::10.2.3.54
SRC PORT : 5000
DEST PORT : 252
TFT 1
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
SRC ADDR6 : 10.3.8.112
SRC PORT : 100~1000
PROTOCOL : ICMP (1)
TFT 2
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
PACKET FILTER 4
PACKET FILTER 5
SRC ADDR4 : 163.215.132.6
TYPE OF SERVICE : 0×0F
SRC PORT : 1000~3000
PROTOCOL : UDP (17)
DEST PORT : 0~100

FIG.21

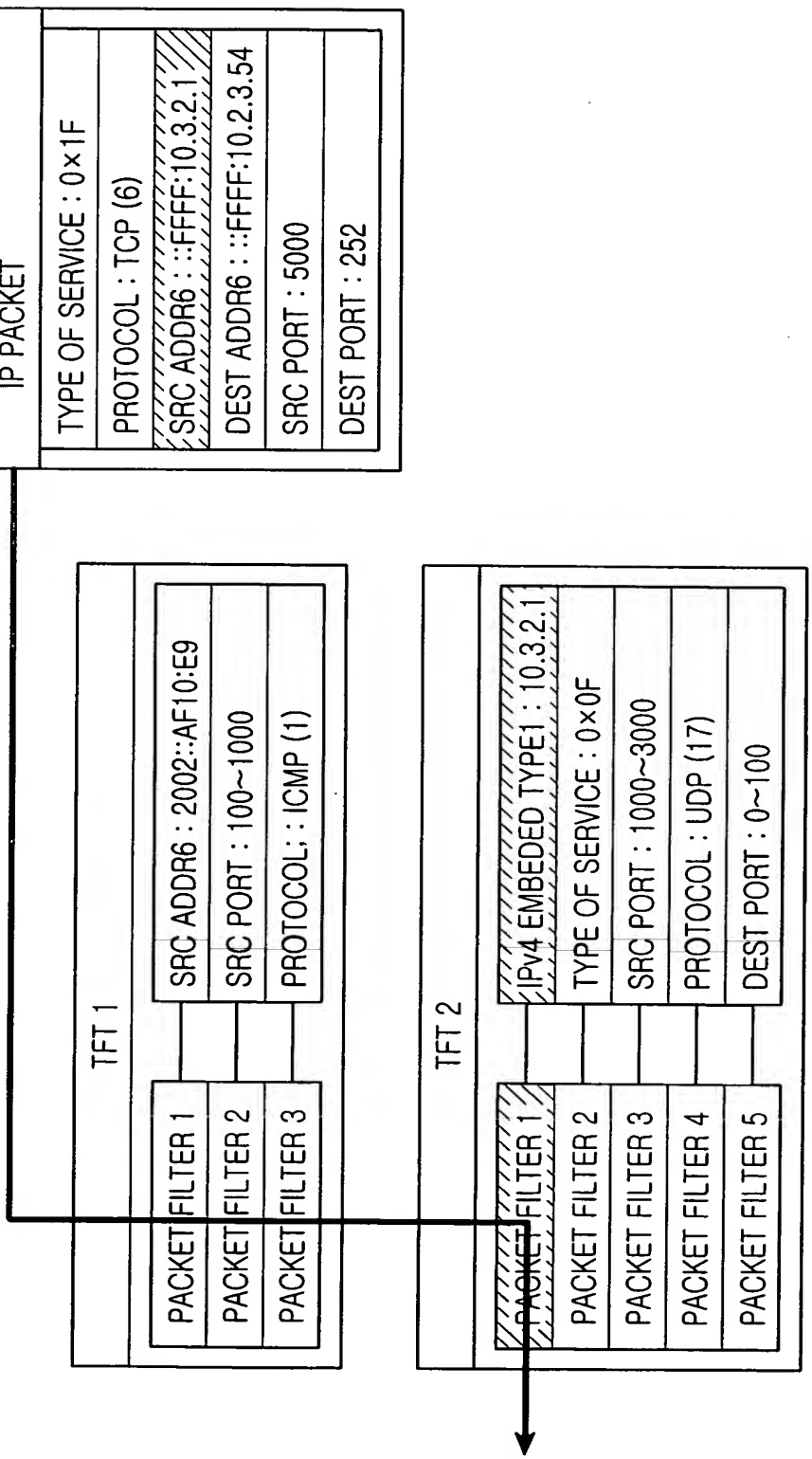
2200
IP PACKET
TYPE OF SERVICE : 0×1F
PROTOCOL : TCP (6)
SRC ADDR6 : ::FFFF:10.3.2.1
DEST ADDR6 : ::FFFF:10.2.3.54
SRC PORT : 5000
DEST PORT : 252
TFT 1
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
SRC ADDR6 : 2002::AF10:E9
SRC PORT : 100~1000
PROTOCOL; : ICMP (1)
TFT 2
PACKET FILTER 1
PACKET FILTER 2
PACKET FILTER 3
PACKET FILTER 4
PACKET FILTER 5
IPv4 EMBEDED TYPE1 : 10.3.2.1
TYPE OF SERVICE : 0×0F
SRC PORT : 1000~3000
PROTOCOL : UDP (17)
DEST PORT : 0~100

FIG.22

NUMBER OF FILTERING OPERATIONS	AMOUNT OF 128-BIT COMPUTATION		AMOUNT OF 32-BIT COMPUTATION		AMOUNT OF BIT COMPUTATION ACCORDING TO PERFORMANCE ENHANCEMENT
	ADDRESS	MASK	ADDRESS	MASK	
1,000	128,000	128,000	32,000	32,000	192,000
10,000	1,280,000	1,280,000	320,000	320,000	1,920,000
100,000	12,800,000	12,800,000	3,200,000	3,200,000	19,200,000
1,000,000	128,000,000	128,000,000	32,000,000	32,000,000	192,000,000

FIG.23

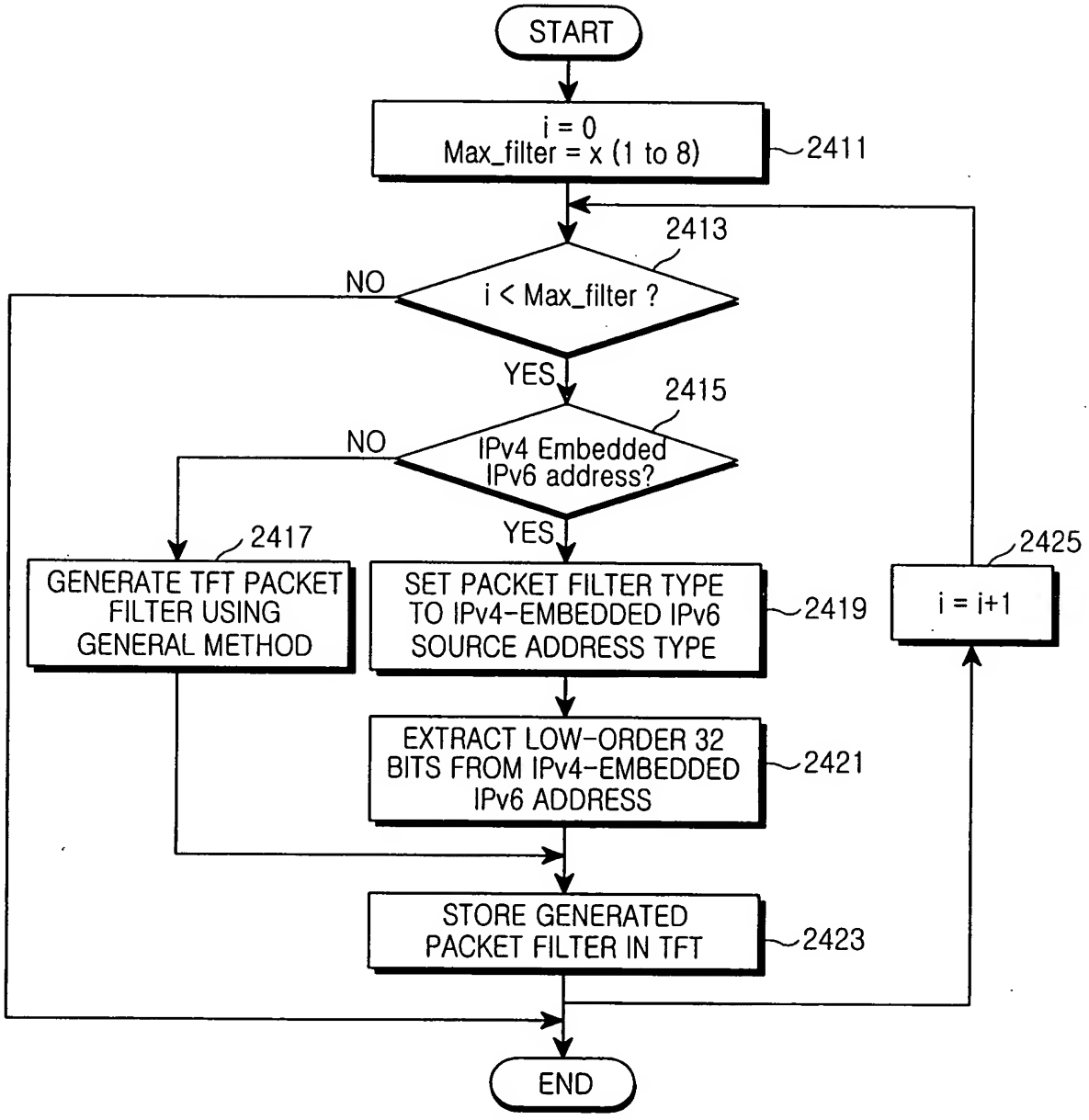
START
i = 0
Max_filter = x (1 to 8)
2411
2413
i < Max_filter ?
NO
YES
2415
IPv4 Embedded IPv6 address?
NO
YES
2417
GENERATE TFT PACKET FILTER USING GENERAL METHOD
SET PACKET FILTER TYPE TO IPv4-EMBEDDED IPv6 SOURCE ADDRESS TYPE
2419
EXTRACT LOW-ORDER 32 BITS FROM IPv4-EMBEDDED IPv6 ADDRESS
2421
STORE GENERATED PACKET FILTER IN TFT
2423
i = i+1
2425
END

FIG.24